



[NAME OF DOCUMENT] Specification  
[TITLE OF THE INVENTION] METHOD FOR MANUFACTURING A  
SEMICONDUCTOR DEVICE

[WHAT IS CLAIMED IS:]

5 [Claim 1] A method for manufacturing a semiconductor device  
comprising the steps of:  
forming an amorphous silicon film on a substrate having an insulating  
surface;  
10 patterning the amorphous silicon film in a predetermined pattern;  
holding a metal element which promotes crystallization of silicon in  
contact with the amorphous silicon film;  
converting the amorphous silicon film into a crystalline silicon film by  
heat treatment for crystallization; and  
15 etching the peripheral portion of a pattern of the crystalline silicon  
film.

[Claim 2] A method for manufacturing a semiconductor device  
comprising the steps of:  
forming a region into which a defect and/or stress is  
concentrated in a predetermined region of an amorphous silicon film;  
20 holding a metal element which promotes crystallization of silicon in  
contact with said amorphous silicon film;  
crystallizing said amorphous silicon film by heat treatment; and  
etching said predetermined region.

[Claim 3] A method for manufacturing a semiconductor device  
comprising the steps of:  
forming a region into which a defect and/or stress is  
concentrated in a predetermined region of an amorphous silicon film;  
holding a metal element which promotes crystallization of silicon  
in contact with said amorphous silicon film;  
30 crystallizing said amorphous silicon film by heat treatment while  
segregating the metal element in the predetermined region; and  
etching said predetermined region.

[Claim 4] A method for manufacturing a semiconductor device  
comprising the steps of:  
35 forming a region into which defects and/or stress is concentrated  
in a predetermined region of an amorphous silicon film;  
holding a metal element which promotes crystallization of silicon  
in contact with said amorphous silicon film;

crystallizing said amorphous silicon film by heat treatment while segregating the metal element, thereby removing the metal element from a region to be an active layer or a region to be a channel forming region of a semiconductor device; and

etching the predetermined region.

[Claim 5] The method according to claim 1 to 4 wherein the metal element which promotes the crystallization of silicon is one or plural sorts selected from Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt, Cu, and Au.

[Claim 6] The method according to claim 1 to 4 wherein the heat treatment is performed at a temperature of 450 to 700°C.

[Claim 7] The method according to claim 1 to 4 wherein an amorphous silicon film is formed on a quartz substrate and a heat treatment is performed at a temperature of 800 to 1100°C.

[Claim 8] The method according to claim 2 to 4 wherein a distance "d" between said selected region and a center of obtained crystalline silicon film is expressed by  $D/30$  to  $D$ , where  $D$  is a dispersion distance of said metal element.

[Claim 9] The method of claim 8 wherein the distance "d" is expressed by  $d=0.2\mu\text{m}$  to  $2\mu\text{m}$ .

[Claim 10] The method of claim 8 wherein the dispersion distance "D" is expressed by  $D=D_0 t \exp(\Delta E/kt)$ .

[Claim 11] The method according to claim 2 to 4 wherein the region into which a defect and/or stress is concentrated is formed by implantation of phosphorus ion or oxygen ion in the predetermined region.